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A REPLY TO SOME CRITICISMS OF THE DELAYED REACTION

ALTHOUGH Professor Watson in his recent book[1] has given a very sympathetic account of a study[2] once made by the present writer, there are certain points in that work which seem to have been misunderstood, and others where additional comments may now be made with profit. The crux of the matter lies in the ascription to raccoons of a process which functions as an idea does in human behavior. "By applying the term 'ideas' to these cues, I mean that they are similar to the memory idea of human experience so far as *function* and *mechanism* are concerned. They are the residual effects of sensory stimuli which are retained and which may be subsequently reexcited. The revival, moreover, is selective and adaptive to the solution of a definite problem, and when aroused they function successfully as a necessary substitute for a definite component of the objective stimulus aspect of the problem."[3] This conclusion was based upon two bulwarks: (1) no external stimulus was present that could be the essential condition of a successful delayed response; and (2) there was no observable portion of the raccoon's body which remained in a constant orientation during the interval of delay. The first argument forced the writer to look for the essential cues within the animal's body. The second argument made it probable that the cue was one which could be reinstated, *i. e.*, one which was not present continuously during the interval of delay. This last conclusion can never be made with absolute certainty because certain motor sets which were not and could never be visible may have been constantly maintained. However, this constant maintenance was thought further improbable because successful reactions were made, although the animal had been violently distracted during the delay.

Professor Watson takes me to task gently under both of the above heads. He says, with respect to the absence of continuous bodily orientation, "On the other hand, *several*[4] of the responses of the raccoons and all of the responses of the children offered a mode of behavior which can not be explained in the terms of maintained bodily attitude" (p. 227). Again, it is possible "that there was an actual error in observation. Most of the raccoons were admittedly making the correct reaction upon the basis of maintained bodily orientation." The word "several" would suggest that the number was small and could be accounted for by chance. Yet if the reader will refer to the descriptions,[5] I think he will be convinced that this was not the case. The following observation was also made: "Again, the fact that this type of behavior dominated for several days at a time indicates that something more than chance was manifesting itself. At 8 seconds' delay, *e. g.,* Jack made 10 correct reactions in one day, starting with wrong orientations. The following two days had 7 each; and the following two, 4 each. The next day the delay was increased to 9 seconds and 8 correct reactions with wrong orientations were made. Eight, 6, 4, 8, 6 were the records of such reactions for the following days. The next day after these, 10 seconds' delay was given. Here 9 correct reactions were made, starting with wrong orientations. These are fair samples of the prevalence of this type of reaction."[6] To this should be added a careful perusal of Table XI., which considers the relative frequencies of appearance of the two, orientation and non-orientation behavior, for a long period of time. The significant point here is the large percentage of correct reactions out of the total number of responses made with faulty orientation. There was no "error in observation" as Professor Watson fears. It is stated[7] that different persons had operated the release. These persons were graduate students. The reactions were also witnessed by Professor Carr. All of the observers agreed that many times no constantly maintained attitudes could be detected. It would probably have been wise to have stated this explicitly in the monograph.

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[1] Watson, Jno. B., "Behavior: An Introduction to Comparative Psychology," Holt and Co., N. Y., 1914.

[2] Hunter, Walter S., "The Delayed Reaction in Animals and Children," *Behavior Monographs*, Vol. 2, No. 1, 1913.

[3] "Delayed Reaction," page 73.

[4] Italics mine.

In Professor Watson's book[8] it is stated that the raccoons may have depended upon olfactory cues derived from the external environment or upon temperature cues. Watson is right when he says these factors were not sufficiently controlled, *if* he means that more controls might have been used. The writer still holds, however, that considering the external conditions and the types of behavior present (and after all this is the basis for judgment) the above external stimuli of temperature and odor were controlled adequately enough to render valid the deductions drawn. Could the raccoons have been reacting to temperature and olfactory differences which varied in location with the location of the light? The writer thinks not. (1) It was only possible to detect occasionally any temperature change at all due to the presence, for five seconds, of the miniature light. The maximum change detected at any time was 1° C., and this obviously was immediately after the light was turned off and not after a delay of 10–25 seconds. When discussing this[9] the writer did so in a summary fashion, relying upon the reader's remembrance of the behavior described on previous pages.[10] The animal's behavior during delay was not at all conducive to the detection of minute (temperature) and hypothetical (odor) stimuli. The animal was in constant motion about the release box in its attempt to get out. Moreover, the animal oriented immediately upon the presentation of the light. No one observing the responses in the light of the above facts would have entertained the hypothesis that temperature and odor were effective. When the animal was oriented toward the box on the extreme right at the moment of release, while the box on the extreme left was the proper one to choose, the impetus of the animal's efforts to escape carried him practically always half way to the right-hand box. Yet he would wheel and escape successfully, passing the middle box by. The whole reaction is made quickly and with decision.

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[5] See "Delayed Reaction," pages 43–46 and 49–50.

[6] *Ibid.,* page 44.

[7] *Ibid.,* page 66.

[8] See pages 225 and 227.

[9] "Delayed Reaction," page 66.

There is a further factor militating against the possibility of temperature and odor having been functional as cues. The point was in the writer's mind when the monograph was written, but was not utilized as it now seems it should have been. The raccoons were confined in a release whose front, sides, and top were of *glass*. And yet they oriented at once and reacted as above described. This structure was commented upon in the paper (p. 23). It is there stated that another release whose faces were covered with wire was used later in the experimentation. The writer's attention was so occupied with the other and to him sufficient arguments against the utilization of temperature that he neglected to state when the glass release was discontinued. An examination of the diary records kept at the time of the tests shows that the change was made July 12, 1911, approximately nine months after tests had been started with Bob and Betty and just prior to the beginning of the work on Jack and Jill. Let the reader refer to one of these tables.[11] Reading down the first column, he will soon come to the entry "2nd stage 240 86." The change of release was made 61 trials before the close of these 240 trials. It will be seen from this that delays of 30 seconds were made with the glass release.[12] The release box used with the rats was also of glass. A wire one was used with the dogs.

Certainly the most probable cues are not temperature and odor. It is not to be expected that the data and conclusions presented in a new piece of work will be accepted as final until other investigators have carefully verified them.

It is not necessary to enter into a discussion concerning language.

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[10] *Cf.* pages 44–46 and 48–51.

[11] Page 83, Table XV.

[12] The wire release referred to in this table is the large wire release described on page 37.

Professor Watson says that raccoons do not possess language habits (p. 227), but he elsewhere in the book (pp. 332–3) recognizes the existence of other than vocal language, *i. e.*, language habits having their locus "in the general bodily musculature." Professor Watson admits (p. 333) that he only believes and does not know that this type of language habit is formed later than the vocal type. Frankly the question can not be definitely answered at present. But if we are to get at the genesis of the idea function or, as one might say, the "language habits of the body" and if we are to find out whether or not this appears prior to the genesis of vocal language (*i. e.*, in the animals below man), it will, the writer firmly believes, be through an analysis of the delayed reaction.

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SOCIETIES

THE NEW YORK BRANCH OF THE AMERICAN PSYCHOLOGICAL ASSOCIATION

THE New York Branch of the American Psychological Association met in conjunction with the Section of Anthropology and Psychology of the New York Academy of Sciences on November 23, at Columbia University. The following papers were read:

Some Aspects of Emotional Reactions.—WAYNE P. SMITH.

Importance of Emotion.—Psychological study is beginning to confirm common observation as to the significance of the feelings and emotions in behavior. Educational practise has been in advance of educational theory, for it has sought to utilize feelings and emotions in development of sane and efficient social workers. It has recognized that things that affect or evoke emotional reaction and tend to get more immediate motor response command more thorough consideration and interpretation than do those without this "appeal" or emotional character. From feeling, as the elemental evaluation of things for life, springs inquisitiveness, or the whole knowledge process. The chief function of knowledge seems to be to clarify, that is, to emphasize and unify in a larger perspective, the values of things to which response is to be made.

Conditions of Emotional Reaction.—Emotivity depends, first, upon the nature of the individual as determined by race, sex, age, environment, and disposition; second, on the state of the individual as determined by fatigue, health, inertia, and the functioning of certain organs, especially the cerebral cortex, the skin, certain sense organs,